

GR 99 P 2906

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Description

Internet telephone adapter

5 The present invention relates to an Internet telephone adapter for setting up voice/data links in line-switching networks and packet-switching networks and, in particular, to an Internet telephone adapter for cordless applications.

10 The volume of voice and data links in communications networks using subscriber terminals, such as telephones, mobiles and computer units (PC), is growing at a great rate both in the business sector and in the
15 private sector. For this continuously growing communication volume, incredible sums of money are spent every year both in the business sector and in the private sector.

20 Voice links have normally been set up over "line-switching networks", where a direct (point-to-point) link, as it were, has been set up between the call parties. By contrast, for the data traffic, "data
25 networks" have been used which, as packet-switching networks, packaged the data to be transferred into individual packets and sent them to a receiver via a wide variety of paths. Particularly as a result of the aggregation of a multiplicity of packet-switching
30 switching network has been created which can be used to transfer data, in particular, in a particularly inexpensive manner.

To utilize this great difference in cost between line-
35 switching networks and packet-switching networks, the company Vocaltec has proposed the "Internet phone", which also permits a voice link over a packet-switching network, such as the Internet. Figure

GR 99 P 2906

- 2 -

3 shows a simplified illustration of such an Internet phone configuration in which a voice link between two subscribers is set up over a packet-switching network 1.

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In figure 3, a subscriber terminal TE(A) comprises a computer unit PC (personal computer) which has a sound card (not shown) with a connected loudspeaker LA and a microphone MI. The computer unit PC also has a
10 subscriber access adapter (e.g. modem), which is not shown but which is connected to a service provider 2a (SP) via a subscriber line TL. In this case, the service provider 2a, as a node in a packet-switching bidirectional communications network 1, such as the
15 Internet, provides access to this network.

In the same way, a second call party has a subscriber terminal TE(B) having a computer unit PC and an associated sound card with a connected microphone MI
20 and a loudspeaker LA, the computer unit PC again setting up a connection to a service provider 2b (SP), preferably via a subscriber access adapter in the form of a modem. The service provider 2b again has an access facility to the packet-switching bidirectional
25 communications network 1.

To set up a voice link between the subscriber terminal TE(A) and the subscriber terminal TE(B) over the packet-switching network 1, the computer units PC in
30 question are operated using a program (e.g. from Vocaltec) which is such that the voice data recorded by the respective microphone are transferred, packaged into small packets, over the packet-switching network 1 and are assembled at the receiver end such that a
35 continuous voice signal is in turn obtained at the loudspeaker LA. In this

GR 99 P 2906

- 3 -

way, it is possible to set up an extremely inexpensive voice link throughout the world over the Internet, for example.

- 5 However, a drawback of a such a solution is that it is not possible to use conventional telephones, and hence a connection can be set up only between two Internet telephones having appropriate computer units PC.
- 10 The document WO 98/42104 has therefore disclosed a system and a method for setting up a voice link over both a packet-switching network and a line-switching network which now also allow "Internet telephones" to be connected to "normal telephones". In this context,
- 15 however, the Internet telephones still comprise a computer-assisted system with a microphone and a loudspeaker and a specifically aligned local service provider for coupling both the line-switching data and the packet-switching data.
- 20 The document US 5,838,665 describes another adapter apparatus which can be used to couple the Internet telephone systems described above to conventional telephones. In this context, connecting a normal
- 25 telephone to an "Internet telephone system" makes it possible to provide, by way of example, multiparty services etc. between the different systems. However, a drawback with this system, too, is that a computer assisted terminal unit (PC) still produces the
- 30 "Internet telephone", which is why it is rejected by a large number of users.

The invention is therefore based on the object of providing an Internet telephone adapter for setting up

35 voice/data links in line-switching networks and packet-switching networks which is both inexpensive and user friendly.

GR 99 P 2906

- 4 -

The invention achieves this object by means of the features of patent claim 1.

Particularly the use of a base unit having a transfer
5 method evaluation unit which, on the basis of the type
of voice/data link identified, performs data conversion
between the data on a subscriber terminal interface and
the packet-switching network or the line-switching
10 network results in an Internet telephone adapter which
is extremely simple to use and, without using a
complicated computer system (PC), turns any
conventional subscriber terminal into a terminal which
allows a voice/data link both over line-switching
networks and over packet-switching networks.

15 Preferably, the subscriber terminal interface comprises
a DECT interface based on the ETSI standard, and the
standard data interface comprises a serial V.24
interface based on the ITU standard. Such an embodiment
20 has already been implemented, by way of example, in the
Gigaset M101 data terminal from the company Siemens,
which allows conventional cordless telephones to be
converted into cordless Internet telephones by means of
a slight modification to the base station operating as
25 base unit. In this context, the subscriber access
adapter used can preferably be an analog voice modem or
a digital ISDN access adapter.

Preferably, the data conversion in the base unit for a
30 connection over the packet-switching network involves
performing TCP/IP data protection, which results in an
alignment with the Internet.

Particularly when a cordless application is used, the
35 data conversion involves converting the received
voice/data information from a DECT-GAP standard to the
Voice-Over-IP protocol and vice versa.

GR 99 P 2906

- 5 -

The further subclaims identify further advantageous refinements of the invention.

5 The invention is described in more detail below using an exemplary embodiment with reference to the drawing, in which:

figure 1 shows a simplified illustration of an Internet telephone system with an inventive Internet telephone adapter;

figure 2 shows a schematic illustration of a protocol structure for the system shown in figure 1; and

15 figure 3 shows a simplified illustration of an Internet telephone system based on the prior art.

20 Figure 1 shows a simplified illustration of an Internet telephone system for setting up a voice/data link over a line-switching network 1' or a packet-switching network 1. In figure 1, a subscriber terminal TE is connected via a subscriber terminal interface LS to the Internet telephone adapter ITA, which is itself
25 connected to a service provider 2 (SP) via a subscriber line TL. In figure 1, the service provider 2 allows connection both to a packet-switching network 1, which preferably comprises the Internet, or to a line-switching network 1', which preferably comprises a
30 public telephone network (Public Switched Telephone Network, PSTN).

As has already been described above, voice and data are
35 packaged into packets in the packet-switching network 1 and are sent to the network 1 using a destination address. When they have arrived at the destination

GR 99 P 2906

- 5a -

address, the individual packets are assembled again
according to their prescribed

GR 99 P 2906

- 6 -

order and are output on a subscriber (not shown). By contrast, in the line-switching network 1', a direct connection is set up between the respective subscribers, and the information is transferred in the
5 form of voice or data.

The Internet telephone adapter ITA essentially comprises a base unit B which is connected to a subscriber access adapter VM via a standard data
10 interface V.24.

In the preferred exemplary embodiment shown in figure 1, the subscriber terminal TE comprises a cordless telephone for setting up an air interface LS based on
15 the ETSI standard DECT. Since such a subscriber terminal TE is able to transmit only voice, the air interface LS is based on the DECT-GAP standard. At the opposite end, the air interface LS shown in figure 1 is set up by a base station which acts as a base unit B
20 and preferably corresponds essentially to the cordless GIGASET M101 data terminal from Siemens. Such a base unit essentially comprises an air interface unit LE for setting up the air interface LS, a data interface unit SS for setting up the standard data interface V.24, and
25 a control unit SE which controls both the air interface unit LE and the data interface unit SS. Preferably, the standard data interface V.24 used is a serial interface based on ITU-V.24 standard. It is also possible to use any other, interface, however, such as parallel
30 interfaces, USB, fire wire, etc.

On the standard data interface V.24, the subscriber access adapter VM is connected in order to set up a connection to the service provider 2 (SP). Preferably,
35 the subscriber access adapter VM comprises an "analog voice modem", which permits the transfer of information both

GR 99 P 2906

- 6 -

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GR 99 P 2906

- 7 -

in a data format using a modem M or in a voice format using a digital/analog converter unit V (voice). In this context, the respective transfer is selected by means of a selection unit AE, which can preferably be
5 programmed with the aid of standardized AT-Hayes commands using the standard data interface V.24.

To set up an "Internet voice/data link", it is necessary for a multiplicity of functions, preferably
10 performed by the control unit SE, to be implemented in the base unit B. Particularly when the data terminal GIGASET M101 is used, the inventive Internet telephone adapter ITA can be produced by slightly modifying (software, firmware) the base unit B and using a
15 conventional voice modem VM. In this context, the control unit SE in the base unit B needs to implement a dialing evaluation unit which makes it possible to distinguish a normal voice/data link, i.e. a link over the line-switching network 1', from an Internet
20 voice/data link, i.e. a link over the packet-switching network 1. For this purpose, a number plan is designed, for example, which makes it possible to make this distinction using currently available dialing digits (such as 0 to 9, *, #).

25

In the case of an Internet voice/data link initiated with "#", for example, a selection to be produced by the base unit B comprises the IP address (IP, Internet protocol) of the required call party. In this case, the
30 base unit B also uses the standard data interface V.24 to select a modem mode on the voice modem, as a result of which the information is sent in the data format via the modem M to the service provider 2 with the IP address produced.

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If, on the other hand, a normal voice/data link is to be set up (e.g. a normal telephone number is dialed without

GR 99 P 2906

- 8 -

"#" in front), then the base unit B needs to actuate the selection unit AE in the voice modem VM such that the converter unit V is selected and the voice data are forwarded transparently, as it were, to the service provider 2. Since there is no IP address in this case, the service provider 2 would set up the link over the network 1'.

In another case (not shown), the air interface LS can also be used to connect a data subscriber terminal which transmits exclusively data. These data are in turn transmitted by the voice modem VM using the modem M, but with no IP address being added. The IP address can now be used by the service provider 2 to establish whether transmission is to be produced using the packet-switching network 1, i.e. over the Internet, or a conventional connection over the line-switching network 1'.

To set up an Internet voice/data link, however, it is not yet sufficient to add an IP address on the basis of the evaluated dialing digits from the subscriber terminal TE. Instead, the base unit B needs to set up data conversion between the air interface LS and the protocol required for the packet-switching network 1.

Figure 2 shows a schematic illustration of a protocol structure for the Internet telephone system shown in figure 1. Figure 2 describes the protocol structure for the preferred exemplary embodiment comprising a DECT-GAP mobile part or subscriber terminal TE and an AT-Hayes voice modem VM connected via a serial V.24 interface. Accordingly, a DECT-GAP protocol is used between subscriber terminal TE and base unit B on the air interface LS. The control unit SE in the base unit B implements a data conversion unit IWU (interworking unit) whose task is to connect

GR 99 P 2906

- 9 -

the different protocol domains to one another. More precisely, the data conversion unit IWU in the base unit B monitors connection setup on the air interface side using its associated DECT-GAP protocol, with setup of a connection being accepted and the dialing which comes from the cordless subscriber terminal TE, i.e. the dialing digits 0 to 9, *, #, etc., being evaluated. When an Internet voice/data link is identified (e.g. "#" in front), the base unit B switches the voice modem VM to modem mode, and the modem M is prompted to dial up the service provider 2. Once the connection has been set up, the data sent by the air interface LS are converted on the basis of the Voice-Over-IP protocol and are sent, protected by means of TCP/IP data protection (transfer control protocol/Internet protocol), to the IP address obtained in the dialing.

Particularly when the subscriber access adapter VM comprises a voice modem, it is possible to set up not only the Internet/data link but also a normal voice/data link over the line-switching network 1'. In this case, for example when the dialing digit "#" is not included, the Internet protocols (TCP/IP, Voice-Over-IP protocol) are avoided by the data conversion unit IWU and the number, or dialing digits, received from the cordless subscriber terminal TE are forwarded to the voice modem VM using AT-Hayes commands, for example, in order to prompt the voice modem VM to dial this number. In this case, the information sent by the subscriber terminal TE is forwarded as voice data by the service provider 2 over the line-switching network 1'.

In order, on the other hand, to be able to receive an incoming internal voice/data link, the Internet telephone adapter ITA naturally needs to be "online". For this purpose, the service provider 2 can provide certain services which allow not only dialing into the

GR 99 P 2906

- 9a -

Internet or packet-switching network 1, but also
calling from the packet-switching network 1.

GR 99 P 2906

- 10 -

In this way, the subscriber terminal TE can also constantly be reached via an Internet/data link.

The Internet telephone adapter described above has been
5 described with reference to figures 1 and 2 using a
cordless subscriber terminal and an analog subscriber
access adapter. It is not limited to these, however,
but rather comprises any other subscriber terminal
10 interfaces for connecting subscriber terminals, such as
data terminals, corded telephones, etc. In this
context, the air interface used is preferably a DECT
interface based on the ETSI standard; however, it is
also possible to use, by way of example, the PHS air
15 interface customary in Japan or the generally known
"Bluetooth" air interface.

Alternatively, instead of the analog subscriber access
adapter (voice modem), it is also possible to use a
digital subscriber access adapter, such as an ISDN-TA,
20 etc. In figure 1, the Internet telephone adapter
comprises a base unit B and a subscriber access adapter
VM which is of discrete design. The subscriber access
adapter can also be incorporated directly in the base
unit B, however. Preferably, the base unit B used can
25 be the GIGASET M101 data terminal. However, it is also
possible to use any other base unit which allows data
conversion between the respective protocol domains as a
result of an additional modification.